EC7-1813CLD2NA SERIES

基于 Intel® Luna Pier 平台 Mini-ITX 主板

Mini-ITX Motherboard Based on Intel® Luna Pier Platform

Version: C00

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Or send to the Technical Support Mailbox support@evoc.com or support@evoc.cn for consultation.

Safety Instructions

1. Please read this manual carefully before using the product;
2. Leave the board or card in the antistatic bag until you are ready to use it;
3. Touch a grounded metal object (e.g. for 10 seconds) before removing the board or card from the anti-static bag;
4. Before installing or removing a board, wear the ESD gloves or ESD wrist strap; handle the board by its edges only;
5. Before inserting, removing or re-configuring motherboards or expansion cards, first disconnect the computer and peripherals from their power sources to prevent electric shock to human bodies or damage to the product;
6. Remember to disconnect the AC power cord from the socket before removing the board or moving the PC;
7. For PC products, remember to disconnect the computer and peripherals from the power sources before inserting or removing a board;
8. Before connecting or disconnecting any terminal, peripheral or any device, be sure the system is powered off and all the power sources are disconnected;
9. After turning off the computer, wait at least 30 seconds before turning it back on

Contents

Chapter 1 Product Introduction

Overview

The product is an embedded Mini-ITX single board based on Intel® Luna Pier Refresh platform.

The board adopts the technique scheme of Intel® Atom™ D510/D410 processor + Intel® ICH8M on-board. It provides one SO-DIMM DDR2 slot on-board up to 2GB. It supports three display modes: VGA, 24-bit LVDS and DVI; two 10/100/1000M Ethernet controllers; eight USB2.0 ports; two SATA hard disk connectors; one IDE connector, one Type I/II CF connector; one HD Audio connector; six or ten serial ports (one supports RS-232/ RS-485, two support power supply); one PS/2 KM connector; one PCI slot; the board adopts the standard ATX power supply or 12V single power supply.

The product adopts Intel® low power consumption solution and supports multi-COM, power supply on serial port, VGA+LVDS dual display, PCI expansion and so on. It can satisfy the industrial requirements of POS and lottery machines; besides, it can be used in advertising machines, information kiosks, self-service terminals and other applications which do not require high performance of the motherboard.

Mechanical Dimensions, Weight and Environment

- Dimensions: 170mm (L) x 177.9mm (W) x 41.5mm (H);
- Net Weight: 0.436 Kg;
- Operating Environment:

  Temperature: -10°C ~ 60°C;

  Humidity: 5% ~ 95% (non-condensing);
- Storage Environment:

  Temperature: -40°C ~ 75°C;

  Humidity: 5% ~ 95% (non-condensing);

Typical Consumption

The typical consumption is based on the following idle status values.

1. The typical power consumption for EC7-1813CLD2NA-D4V10COM is as follows:

   CPU: Onboard Intel® Atom™ D410 1.66GHz (166*10/L2=512K)

   Memory: Transcend DDRII 800 2GB

   Hard Disk: HITIACH 2TB SATA HDD

   - +12V@1.55A; +5%/-3%;

2. The typical power consumption for EC7-1813CLD2NA-D5 is as follows:

   CPU: Intel® Atom™ D510

   Memory: DDRII800 2GB Kingston

   Hard Disk: Seagate 500GB SATA

   - +3.3V@0.62A; +5%/-3%;
   - +5V@1.15A; +5%/-3%;
   - +12V@0.52A; +5%/-3%.

Microprocessor

Intel® Atom™ D510 (Dual Core) /D410 (Single Core) processor on-board, integrated memory controller and graphics controller.

Chipset

Intel® Atom™D510/D410 processor + Intel® ICH8M

System Memory

Provides one 200-Pin SO-DIMM DDR2 memory slot, supporting Un-buffered Non-ECC memory up to 2GB; the memory frequency supported is up to 667MHz.

Display Function

- Adopts CPU with integrated graphics controller;

- Supports VGA, single-channel 24-bit LVDS and DVI display, among which 24-bit LVDS and DVI are homological inputs and the LVDS and DVI are output in Clone mode; supports VGA + LVDS (or DVI) output in Clone or expansion mode; supports three display modes and hot-swap function.
- The maximum resolution and refresh frequency supported by VGA is up to 2048×1536@60Hz while the maximum resolution supported by LVDS is up to 1366×768; The maximum resolution supported by DVI is up to 1600×1200.

Network Function

Provides two 10/100/1000Mbps LAN ports: LAN1 supports Wake-on-LAN function while LAN2 supports LAN PXE booting.

Audio Function

Adopts HD standard, supporting MIC-IN/LINE-IN/LINE-OUT.

Power Feature

Adopts ATX/AT power: ATX power supports ACPI1.0b specification and the status of S0, S1, S4 and S5; AT power supports single 12V power supply.

Expansion Bus

Provides one PCI slot, complying with PCI 2.3 standard.

Watchdog Function

- 255 levels, programmable by minute or second;
- Watchdog timeout interrupt or reset system.

Operating System

Supported OSs: Windows XP, Windows 2000 and Linux.

On-board I/O

- One parallel port, supporting SSP/EEP/ECP operating modes and BIOS modifies operating mode;
- Ten serial ports: COM2 supports RS-232/RS-485 mode selection; COM1 supports Modem wake-up function; COM3 and COM4 support 5V/12V power output;
- One IDE connector;
- One CF card connector;
- Two SATA connectors, supporting hot-swap function;
- Eight USB2.0 ports: USB1 ~ USB4 are brought out via connectors directly; USB5 ~ USB8 are brought out in 2x5Pin headers;
- Two PS/2 keyboard/mouse connectors: one is a standard connector and the other a pin header;
- One 8-channel digital I/O connector.

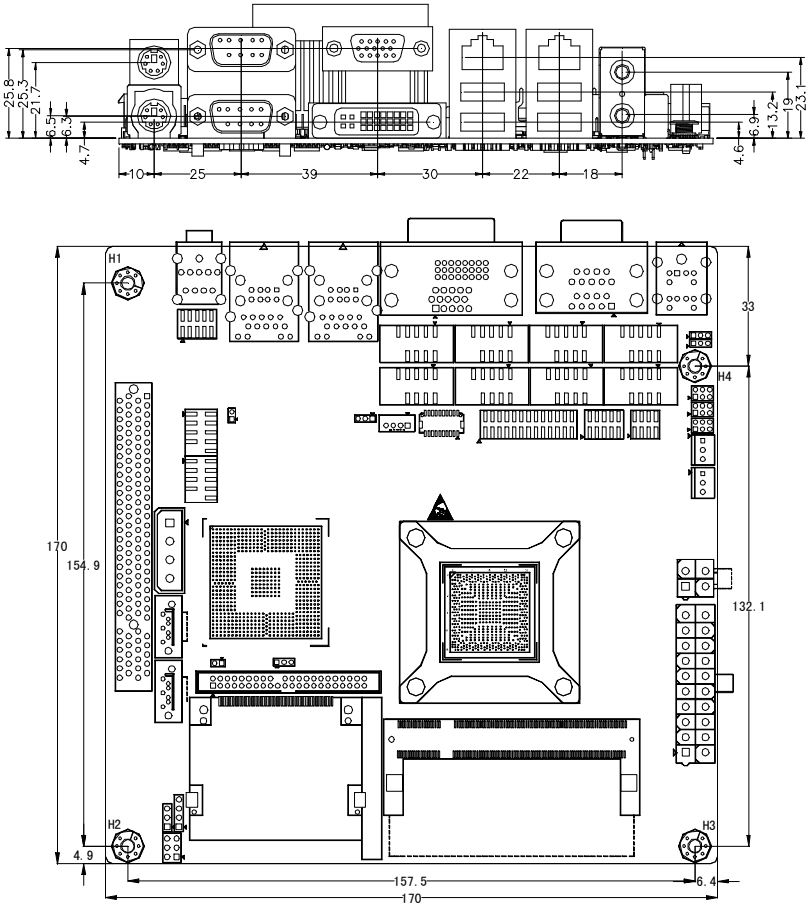
Tips: how to identify the alarms

1. Long “beep” indicates a system memory error;

2. Short beep indicates to power on the computer.

Chapter 2 Installation

Product Outline

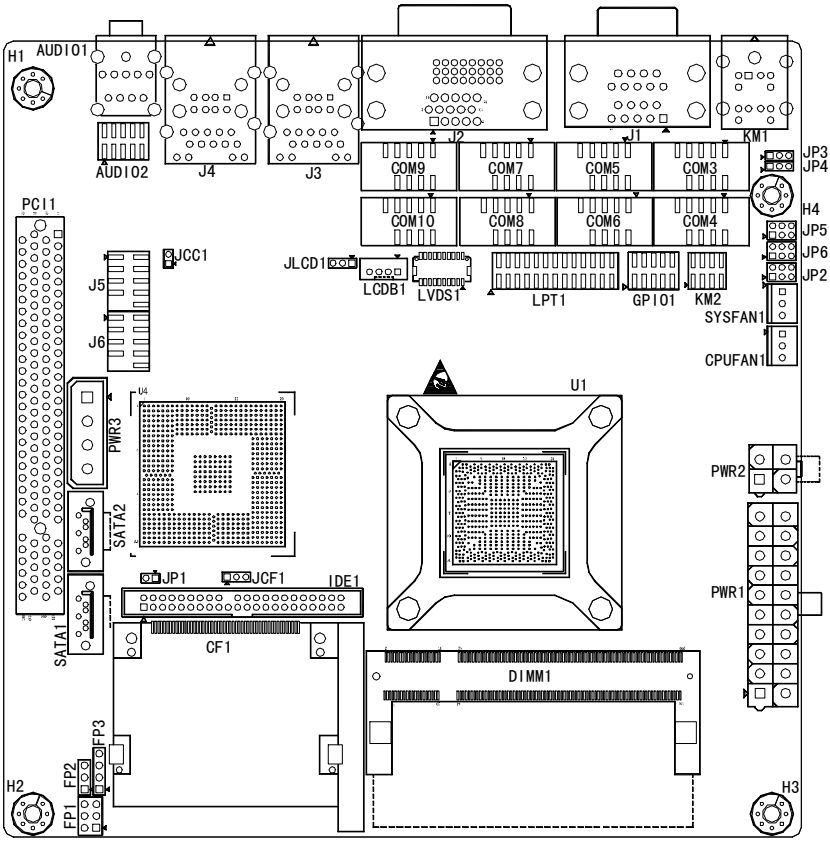


Unit: mm

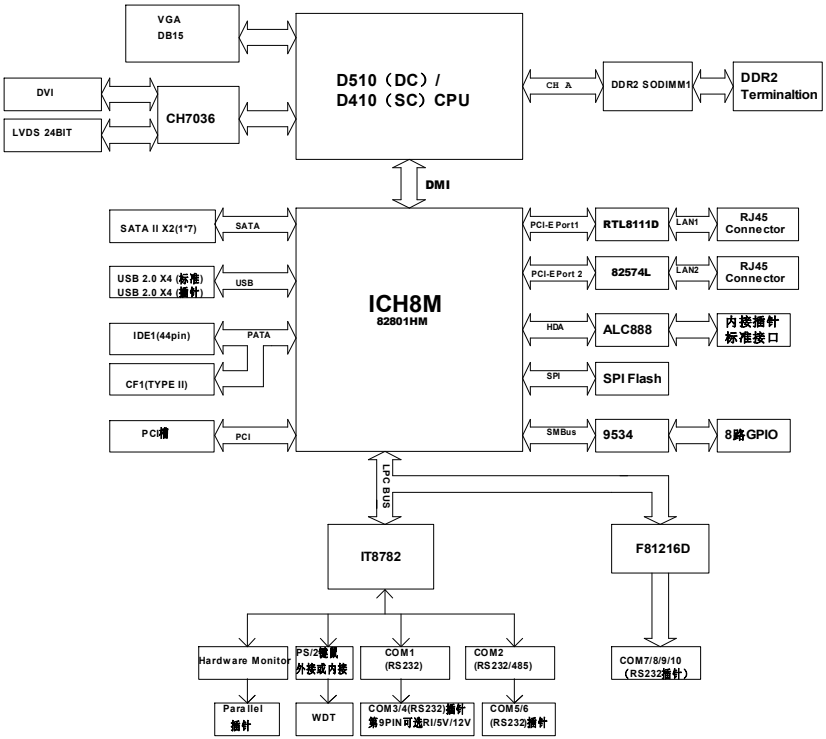
Warning!

Please adopt appropriate screws and proper installation methods (including board allocation, CPU and heat sink installation, etc); otherwise, the board may be damaged. It is recommended to use M3x6 GB9074.4-88 screws at H1 ~ H4.

Locations of Connectors



Structure



Tip: How to identify the first pin of the jumpers and connectors

1. Observe the letter beside the socket, it would be marked with “1” or bold lines or triangular symbols;
2. Observe the solder pad on the back; the square pad is the first pin.

Jumper Setting

1. JCC1: Clear/Keep CMOS Setting (Pitch: 2.0mm)

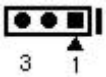
CMOS is powered by the button battery on board. Clearing CMOS will restore original settings (factory default). The steps are listed as follows: (1) Turn off the computer and unplug the power cable; (2) Instantly short circuit JCC1; (3) Turn on the computer; (4) Follow the prompt on screen to enter BIOS setup when booting the computer, load optimized defaults; (5) Save and exit. Please set as follows:

JCC1

Setup	Function
1-2 Open	Normal (Default)
1-2 Short	Clear the contents of CMOS and all BIOS settings will restore to factory default values.

2. JLCD1: Select LCD Operating Voltage (Pitch: 2.0mm)

Different LCD screens have different voltages; the board provides two voltage options, +3.3V and +5V. Only when the selected LCD screen voltage is in accord with the LCD screen operating voltage in use, can the LCD screen operate normally. Please set as follows:

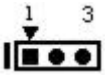


JLCD1

Setup	Function
1-2 Short	+3.3V(Default)
2-3 Short	+5V

3. JCF1: Select CF Card Operating Voltage (Pitch: 2.0mm)

Different CF cards have different voltages; the board provides two voltage options, +3.3V and +5V. Only when the selected CF card voltage is in accord with the CF card operating voltage in use, can the system stability be ensured. Please set as follows:



JCF1

Setup	Function
1-2 Short	+3.3V
2-3 Short	+5V(Default)

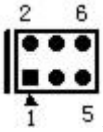
Note: CF card voltage selection are set to comply with different CF cards; as for the CF cards without specified operating voltages, please choose the operating voltage according to actual usage.

4. JP1: Select Mater and Slave Mode for CF Card (Pitch: 2.0mm)

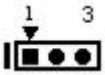
JP1

Setup	Function
1-2 Short	Master
1-2 Open	Slave(Default)

5. JP2 ~ JP4: Select Mode for Serial Port (Pitch: 2.0mm)



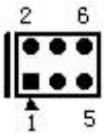
JP2



JP3 ~ JP4

Pin Setting	Mode Selection	
	RS-232 (Default)	RS-485
JP2	1-2	3-4
JP3	1-2	2-3
JP4	1-2	2-3

6. JP5 ~ JP6: Pin 9 Function Selection for COM3/COM4 (Pitch: 2.0mm)



JP5/JP6

Pin Setting	Pin9 Function Selection for COM3/COM4		
	RI#(Default)	VCC5V	VCC12V
JP5	1-2	3-4	5-6
JP6	1-2	3-4	5-6

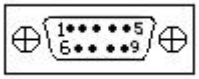
Install the System Memory

The board is configured with one 200Pin DDRII SO-DIMM slot (DIMM1). When installing the memory bank, please pay attention to the following issues:

- Open the buckles on both sides of the memory slot. When installing, align the notch of the memory bank with that of the memory slot and gently insert the module into the slot;
- The memory of 1.8V DDRII 667MHz supported by Intel® Chipset can be used; the maximum memory capacity supported by the board is up to 2GB;
- It is recommended to use the memory bank with SPD to ensure stable operation.

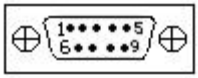
Serial Port

The board provides two standard DB9 serial ports: COM1 supports Modem wake-up function and RS-232 mode; COM2 supports RS-232/RS-485 mode selection; it also provides eight 2x5Pin serial ports (Pitch: 2.54mm) of RS-232 mode. The pin definitions are as follows:



J1(COM1)

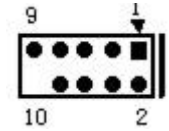
Pin	Signal Name
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#



J1(COM2)

Pin	Signal Name	
	RS-232	RS-485
1	DCD#	Data-
2	RXD	Data+
3	TXD	NC
4	DTR#	NC
5	GND	GND
6	DSR#	NC
7	RTS#	NC
8	CTS#	NC
9	RI#	NC

Note: the data transmission direction of COM2 is controlled automatically under RS-485 mode.



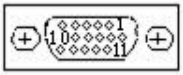
COM3 ~ COM10

Pin	Signal Name
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#
10	NA

Display Connector

The board provides a set of 24-bit single channel LVDS connector and one VGA+DVI-D dual layer connector (Marked as J2 on-board: DVI connector for the upper layer while VGA connector for the lower layer). The pin definitions are as follows:

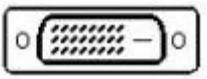
1. VGA Connector



J2(VGA)

Pin	Signal Name	Pin	Signal Name
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	NC	10	GND
11	NC	12	DDCDATA
13	HSYNC	14	VSYNC
15	DDCCLK		

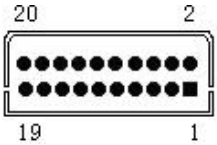
2. DVI-D Connector



J2(DVI)

Pin	Signal Name	Pin	Signal Name
1	DATA2-	13	NC
2	DATA2+	14	+5V
3	GND_DVI	15	GND
4	NC	16	HOTPLUG
5	NC	17	DATA0-
6	DDCCLK	18	DATA0+
7	DDCDATA	19	GND_DVI
8	NC	20	NC
9	DATA1-	21	NC
10	DATA1+	22	GND_DVI
11	GND_DVI	23	CLK+
12	NC	24	CLK-

3. Single-channel 24-bit LVDS Connector



LVDS1

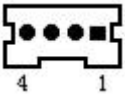
(Pitch: 1.0mm)

Pin	Signal Name	Pin	Signal Name
1	LVDS_D0+	2	LVDS_D0-
3	GND	4	GND
5	LVDS_D1+	6	LVDS_D1-
7	GND	8	GND
9	LVDS_D2+	10	LVDS_D2-
11	GND	12	GND
13	CLK+	14	CLK-
15	GND	16	GND
17	LVDS_D3+	18	LVDS_D3-
19	VDD	20	VDD

Note: The LVDS socket adopted by the board is DF20G-20DP-1V while the corresponding terminal type is DF20A-20DF-1C.

LCD Backlight Control Connector

The board provides one 1x4Pin LCD backlight control connector (Pitch: 2.0mm); the pin definitions are as follows:



LCDB1

Pin	Signal Name
1	VCC_LCDBKLT
2	LCD_BKLTCTL
3	LCD_BKLTEN
4	GND

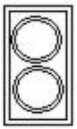
Note: VCC_LCDBKLT---+12V backlight power (The current is limited below 1A);

LCD_BKLTCTL--- backlight control (The signal is output as PWM signal via Pineview D; the voltage amplitude is between 0V-3.3V while the duty cycle is between 0% ~ 100%);

LCD_BKLTEN ---- backlight enable, active high.

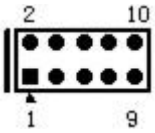
Audio Connector

The board provides one dual layer Audio connector and one 2x5Pin AUDIO pin header.



AUDIO1

Pin	Signal Name
1	LINE_OUT
2	MIC_IN



AUDIO2

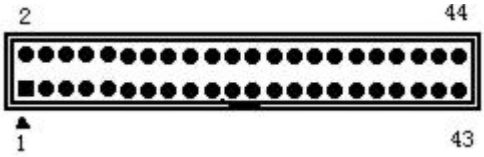
(Pitch: 2.0mm)

Pin	Signal Name	Pin	Signal Name
1	LOUT_R	2	LOUT_L
3	GND_AUDIO	4	GND_AUDIO
5	LIN_R	6	LIN_L
7	GND_AUDIO	8	GND_AUDIO
9	MIC_L	10	MIC_R

IDE Connector

The board provides a set of parallel IDE connector (Pitch: 2.0mm), which shares an IDE bus with the CF card connector; therefore, please pay attention to the following issues when installing the IDE devices:

- If the CF card connector has been occupied with CF storage card, the IDE connector can only connect with one IDE device; one is Master device and the other is Slave device, which can be set via JP1. The relevant jumper is provided on the hard disk to set it to Master device or slave device;
- If the CF card connector is not occupied, the IDE connector can connect with two IDE devices. The way of connection is to connect the Master device to the end of the cable while connect the Slave device to the middle of the cable; when using an Ultra 66/100 hard disk, 80-pin appropriative flat cable shall be adopted.



IDE1

Pin	Signal Name	Pin	Signal Name
1	RESET#	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	Key
21	DREQ	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	IORDY	28	GND
29	DACK#	30	GND

31	IRQ	32	NC
33	DA1	34	ATA66_DET
35	DA0	36	DA2
37	CS1#	38	CS3#
39	LED#	40	GND
41	+5V	42	+5V
43	GND	44	GND

SATA Connector

The board provides two SATA sockets; the pin definitions are as follows:

SATA1/SATA2

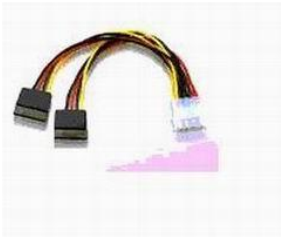
Pin	Signal Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Hot-swap of SATA Hard Disk

Notices for hot-swap of SATA hard disk:

1. The hard disk shall support SATA 2.0 and use 15-pin SATA hard disk power connector.
2. The driver of chipset shall support the hot-swap of SATA hard disk.
3. Hot-swap of SATA hard disk with the operating system is forbidden when system is powered-on.

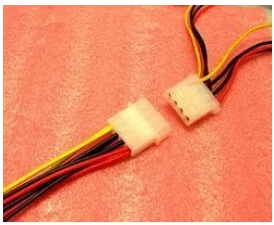
SATA Data Cable

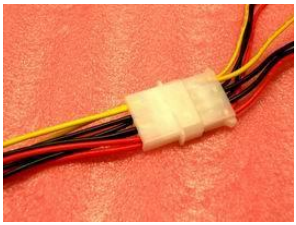


SATA Power Cable

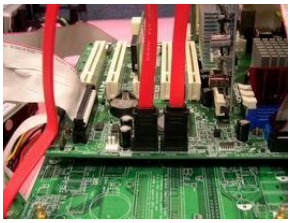
Please carry out hot plug as follows, improper operation may destroy the hard disk or result in data lost.

Hot Plug





Step 1: Please plug the 1 x 4 pin SATA power connector (white) into the power adapter.



Step 2: Please connect the SATA data cable to the SATA connector on board.

Step 3: Please connect the 15-pin SATA power connector (black) to the SATA hard disk.

Step 4: Please connect the SATA data cable to the SATA hard disk.

Hot Unplug

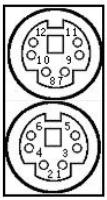
Step 1: Uninstall the hard disk from the device manager.


Step 2: Unplug the data cable from the SATA hard disk.


Step 3: Unplug the SATA 15-pin power connector (black) from the SATA hard disk.

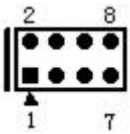
KM Connector

The board provides one standard PS/2 KM combined connector and one KM pin header (Pitch: 2.0mm).



KM1

Pin	Signal Name	Pin	Signal Name
1	KB_DATA	7	MS_DATA
2	NC	8	NC
3	GND	9	GND
4	+5V	10	+5V
5	KB_CLK	11	MS_CLK
6	NC	12	NC



KM2

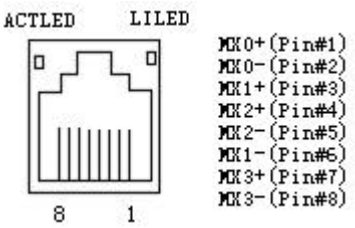
Pin	Signal Name	Pin	Signal Name
1	KB_DATA	2	MS_DATA
3	KB_CLK	4	MS_CLK
5	GND	6	GND
7	+5V	8	+5V

LAN Port and USB Port

The board provides two LAN ports and eight USB ports, among which one LAN port and two USB ports share a set of socket (i.e. J3 and J4 include one LAN port and two USB ports, respectively). In addition, the board also provides two 2x5 Pin USB connectors, (J5 and J6), which can connect with four USB devices.

LAN Port

The board provides two 10/100/1000Mbps Ethernet connectors. ACTLED and LILED are the LED indicators beside the Ethernet port, which respectively indicates the activity status and the transmission status of LAN. Please refer to the status description for each LED:



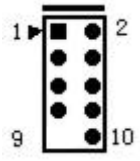
J3(LAN1)/J4(LAN2)

ACTLED (Green)	LAN Activity Status Indicator		LILED (Dual-Color: O/G)	LAN Speed Indicator
			Green	1000Mbps
Blink	Data Transmitting		Orange	100Mbps
Off	No Data to Transmit		Off	10Mbps

USB Port

J3(USB1/USB2)
J4(USB3/USB4)

Pin	Signal Name
1	+5V
2	USB_Data-
3	USB_Data+
4	GND

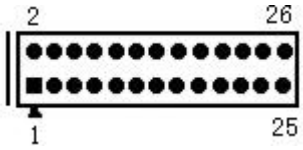


J5(USB5/USB6)
J6(USB7/USB8)
Pitch: 2.54mm

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	USB1_Data-	4	USB2_Data-
5	USB1_Data+	6	USB2_Data+
7	GND	8	GND
9	NA	10	GND

Parallel Port

The board provides one 2x13Pin parallel port (Pitch: 2.0mm).

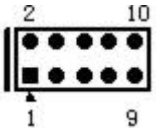


LPT1

Pin	Signal Name	Pin	Signal Name
1	STB#	2	AFD#
3	PD0	4	ERR#
5	PD1	6	INIT#
7	PD2	8	SLIN#
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

GPIO Connector

The board provides one 2x5Pin GPIO pin header (Pitch: 2.0mm).



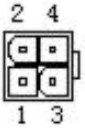
GPIO1

Pin	Signal Name	Pin	Signal Name
1	GPIO1	2	GPIO5
3	GPIO2	4	GPIO6
5	GPIO3	6	GPIO7
7	GPIO4	8	GPIO8
9	GND	10	NC

Note: the pins on GPIO are bi-directional signals. To facilitate test and application, the factory default value is that Pin 1, 3, 5, and 7 are for input while Pin 2, 4, 6 and 8 are for output.

Power Connector

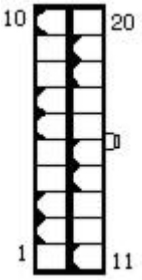
1) AT Power Connector: 12V Single Power Connector (Pitch: 4.2mm)



PWR2

Pin	Signal Name
1	GND
2	GND
3	+12V
4	+12V

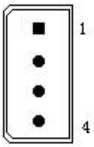
2) ATX Power Connector (Pitch: 4.2mm)



PWR1

Pin	Signal Name	Pin	Signal Name
1	+3.3V	11	+3.3V
2	+3.3V	12	-12V
3	GND	13	GND
4	+5V	14	PS_ON#
5	GND	15	GND
6	+5V	16	GND
7	GND	17	GND
8	PWROK	18	-5V
9	+5VSB	19	+5V
10	+12V	20	+5V

3) SATA Power Connector (Pitch: 5.08mm)

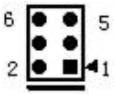


PWR3

Pin	Signal Name
1	+12V
2	GND
3	GND
4	+5V

Status Indicating and Control Connector

1) ATX Power Switch and HDD Indicator Connector (Pitch: 2.54mm)



FP1

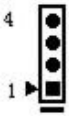
Pin	Signal	Pin	Signal Name
1	PWRBTN#	2	GND
3	GND	4	RESET#
5	HDD_LED-	6	HDD_LED+

2) Power Indicator Connector (Pitch: 2.54mm)

FP2

Pin	Signal Name
1	PWR_LED+
2	NC
3	GND

3) Loudspeaker Output Connector (Pitch: 2.54mm)

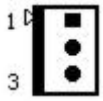


FP3

Pin	Signal Name
1	SPEAKER
2	NC
3	GND
4	+5V

Fan Connector

The board provides two 1x3Pin fan connectors (Pitch: 2.54mm).



CPUFAN1/SYSFAN1

Pin	Signal Name
1	GND
2	+12V
3	FAN_IO

FAN_IO: fan speed impulse output.

CF Card

Marked as CF1 onboard.

Pin	Signal Name	Pin	Signal Name
1	GND	26	CD1#
2	D3	27	D11
3	D4	28	D12
4	D5	29	D13
5	D6	30	D14
6	D7	31	D15
7	CS0#	32	CS1#
8	GND	33	VS1#
9	ATASEL#	34	IOR#
10	GND	35	IOW#
11	GND	36	WE#
12	GND	37	IRQ
13	VCC	38	VCC
14	GND	39	CSEL#
15	GND	40	VS2#
16	GND	41	RESET#
17	GND	42	IORDY
18	A2	43	DREQ
19	A1	44	DACK#
20	A0	45	DASP#
21	D0	46	ATA66_DET
22	D1	47	D8
23	D2	48	D9
24	WP/IOCS16#	49	D10
25	CD2#	50	GND

Expansion Slot

PCI slot is used as the standard PCI (version 2.3) connector (PCI1); the pin definitions are as follows:

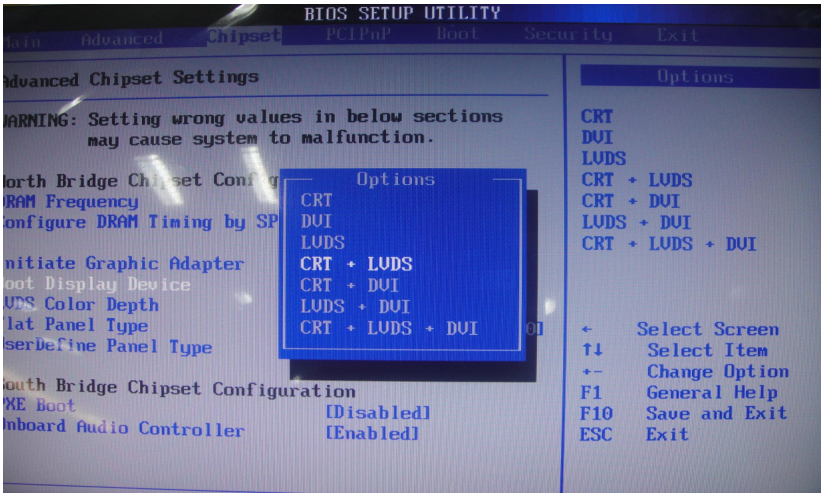
Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	TRST#	A31	PCI_AD18	B1	-12V	B31	+3.3V
A2	+12V	A32	PCI_AD16	B2	TCK	B32	PCI_AD17
A3	TMS	A33	+3.3V	B3	GND	B33	PCI_C/BE#2
A4	TDI	A34	PCI_FRAME#	B4	TDO	B34	GND
A5	+5V	A35	GND	B5	+5V	B35	PCI_IRDY#
A6	INTA#	A36	PCI_TRDY#	B6	+5V	B36	+3.3V
A7	INTC#	A37	GND	B7	INTB#	B37	PCI_DEVSEL#
A8	+5V	A38	PCI_STOP#	B8	INTD#	B38	GND
A9	Null	A39	+3.3V	B9	PRSNT1#	B39	PCI_PLOCK#
A10	+5V	A40	SMCLK	B10	Null	B40	PCI_PERR#
A11	Null	A41	SMDATA	B11	PRSNT2#	B41	+3.3V
A12	GND	A42	GND	B12	GND	B42	PCI_SERR#
A13	GND	A43	PCI_PAR	B13	GND	B43	+3.3V
A14	3.3Vaux	A44	PCI_AD15	B14	Null	B44	PCI_C/BE#1
A15	PCI_RST#	A45	+3.3V	B15	GND	B45	PCI_AD14
A16	+5V	A46	PCI_AD13	B16	PCI_CLK	B46	GND
A17	PCI_GNT#	A47	PCI_AD11	B17	GND	B47	PCI_AD12
A18	GND	A48	GND	B18	PCI_REQ#	B48	PCI_AD10
A19	PCI_PME#	A49	PCI_AD9	B19	+5V	B49	GND
A20	PCI_AD30	A50	PCI_C/BE#0	B20	PCI_AD31	B50	PCI_AD8
A21	+3.3V	A51	+3.3V	B21	PCI_AD29	B51	PCI_AD7
A22	PCI_AD28	A52	PCI_AD6	B22	GND	B52	+3.3V
A23	PCI_AD26	A53	PCI_AD4	B23	PCI_AD27	B53	PCI_AD5
A24	GND	A54	GND	B24	PCI_AD25	B54	PCI_AD3
A25	PCI_AD24	A55	PCI_AD2	B25	+3.3V	B55	GND
A26	PCI_IDSEL	A56	PCI_AD0	B26	PCI_C/BE#3	B56	PCI_AD1
A27	+3.3V	A57	+5V	B27	PCI_AD23	B57	+5V
A28	PCI_AD22	A58	PCI_REQ64#	B28	GND	B58	PCI_ACK64#
A29	PCI_AD20	A59	+5V	B29	PCI_AD21	B59	+5V
A30	GND	A60	+5V	B30	PCI_AD19	B60	+5V

Note: when adopting PWR2 to supply power, Pin B1 is NC.

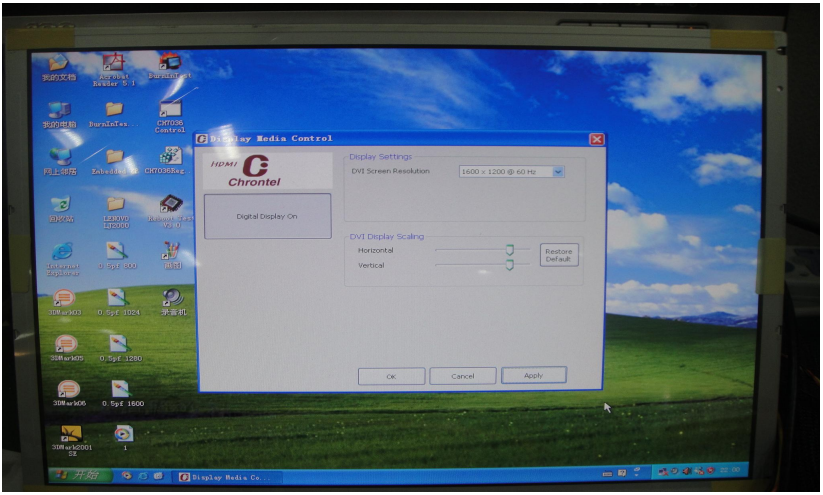
Instructions for DVI Display Output

The board supports three display modes: VGA, LVDS and DVI; DVI display and LVDS display are Clone mode. Please set as follows:

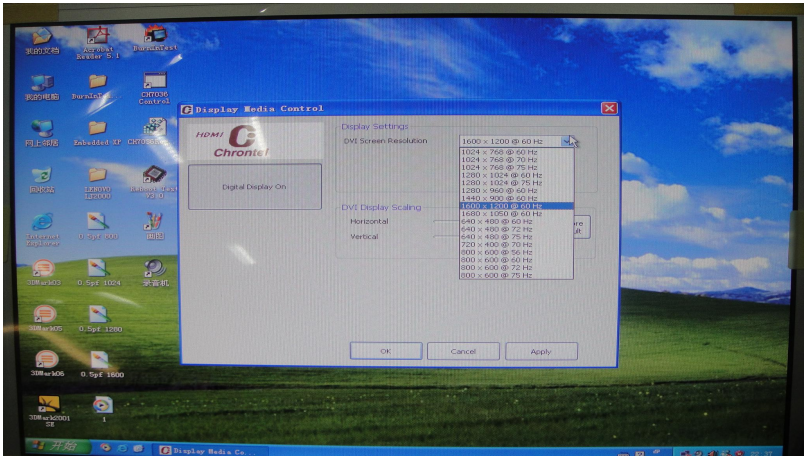
1. Enter the BIOS menu to set the DVI display mode as shown in the figure below:



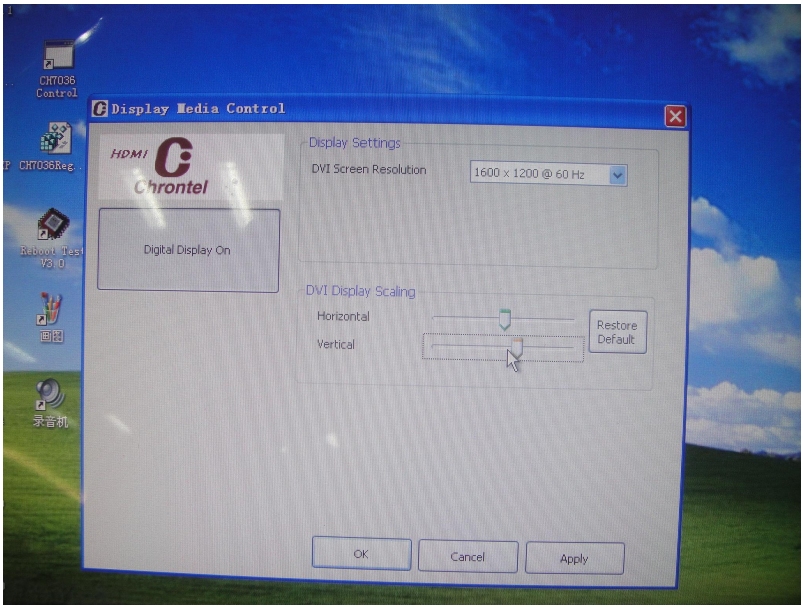
2. After installing the operating system for the first time, the DVI driver program is required; please install according to the enclosed CD. The driver can only be used to set the DVI display function. Users may choose 18-bit/24-bit LVDS output according to the connected LVDS screen. Please refer to Readme.txt for detailed driver program setting. The following interfaces will appear after completing driver installation:



3. Set the resolution for DVI. After the motherboard reads the resolution supported by the display, the resolution supported by the display will be shown. Please refer to the figure below:



4. Set the display dimensions of the DVI, DVI displays the extendable screen dimensions. Please refer to the figure below:



5. After setting the driver, the parameters are restored. It will display by the same configuration next time.

6. DVI display function is realized via CH7036A, which shall abide by the following suggestions: 1. The output resolution for DVI shall be no less than that of the LVDS set in the BIOS menu; if the output resolution for DVI is less than that of the LVDS, the fonts displayed under certain frequency might be blurred. 2. If the background color is set to pale blue, then erect stripes might appear under certain frequency; which is caused by the implementation mechanism of CH7036A and is normal.

Chapter 3 BIOS Setup

BIOS Overview

BIOS (Basic Input and Output System) is solidified in the flash memory on the CPU board. Its main functions include: initialize system hardware, set the operating status of the system components, adjust the operating parameters of the system components, diagnose the functions of the system components and report failures, provide hardware operating and controlling interface for the upper level software system, guide operating system and so on. BIOS provides users with a human-computer interface in menu style to facilitate the configuration of system parameters for users, control power management mode and adjust the resource distribution of system device, etc.

Setting the parameters of the BIOS correctly could enable the system operating stably and reliably; it could also improve the overall performance of the system at the same time. Inadequate even incorrect BIOS parameter setting will decrease the system operating capability and make the system unstable or even unable to operate normally.

BIOS Parameter Setup

Prompt message for BIOS setting may appear once the system is powered on. At that time (invalid at other time), press the key specified in the prompt message (usually <Del>) to enter BIOS setting.

When the BIOS setting in CMOS is destroyed, system may also require entering BIOS setting or selecting certain default value.

All the setup values modified by BIOS are saved in the CMOS storage in system. The CMOS storage is powered by battery; unless clearing CMOS is executed, its contents would not be lost even if powered off.

Note! BIOS setting will influence the computer performance directly. Setting parameter improperly will cause damage to the computer; it may even be unable to power on. Please use the internal default value of BIOS to restore the system.

Our company is constantly researching and updating BIOS, its setup interface may be a bit different. The figure below is for reference only; it may be different from your BIOS setting in use.

Basic Function Setting for BIOS

After starting SETUP program, the main interface of CMOS Setup Utility will appear:

BIOS SETUP UTILITY	
System Overview	←→ Select Screen ↑↓ Select Item + - Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
Processor Type : Intel(R) Atom(TM) CPU K510 @ 1.66GHz Speed :1666MHz Cores :2 System Memory Size :1015MB System Time [00:47:55] System Date [Mon 01/11/2010]	
V02.57 (c)Copyright 1985-2004,American Megatrends, Inc.	

◆ **Main**

➢ **System Time**

Choose this option and set the current time by < + > / < - >, which is displayed in the format of hour/minute/second. Reasonable range for each option is: Hour (00-23), Minute (00-59), Second (00-59).

➢ **System Date**

Choose this option and set the current date by < + > / < - >, which is displayed in the format of month/date/year. Reasonable range for each option is: Month (Jan.-Dec.), Date (01-31), Year (Maximum to 2099), Week (Mon. ~ Sun.).

◆ **Advanced**

BIOS SETUP UTILITY	
Advanced Settings	Configure CPU
WARNING: Setting wrong values in below sections may cause system to malfunction ►CPU Configuration ►IDE Configuration ►Super I/O Configuration ►Hardware Health Configuration ►USB Configuration ►Power Management Configuration ►Clock Generator Configuration	←→ Select Screen ↑↓ Select Item Enter Go to Sub Screen Tab Select Field F1 General Help F10 Save and Exit ESC Exit
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➢ **CPU Configuration**

BIOS SETUP UTILITY		
Configure advanced CPU settings		
Brand String:		
Intel(R) Atom(TM) CPU K510	@ 1.66GHz	
Frequency;	:1.66GHz	←→ Select Screen ↑↓ Select Item + - Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
FSB Speed;	:667MHz	
Cache L1;	:48 KB	
Cache L2;	:1024 KB	
Ratio Actual Value	:10	
Hyper Threading Technology	[Enabled]	
Intel(R) SpeedStep(tm) tech	[Enabled]	
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- **Hyper Threading Technology**

  Control switch for the Intel Hyper Threading Technology function.

- **Intel(R) SpeedStep(tm) tech**

  Control switch for the Intel(R) SpeedStep(tm) tech function.

➢ **IDE Configuration**

BIOS SETUP UTILITY		
IDE Configuration		
ATA/IDE Configuration	[Enhanced]	
Configure SATA as	[IDE]	
		←→ Select Screen
		↑↓ Select Item
▶Primary IDE Master	:[Not Detected]	+- Change Field
▶Primary IDE Slave	:[Not Detected]	Tab Select Field
▶Secondary IDE Master	:[Not Detected]	F1 General Help
▶Secondary IDE Slave	:[Not Detected]	F10 Save and Exit
▶Third IDE Master	:[Not Detected]	ESC Exit
▶Third IDE Slave	:[Not Detected]	
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- **ATA/IDE Configuration**

  This option is used to configure the operating mode for ATA; there are two options: Enhanced and Compatible.

- **Configure SATA as**

  SATA controller type selection; there are two options for this item: IDE and AHCI. Only when the ATA/IDE Configuration is under Enhanced mode, is AHCI supported.

  The AHCI function requires supports from hardware chip and OS.

- **Legacy IDE Channels**

Configure the IDE channel type under Compatible mode; there are four options: SATA Only, SATA Pri, PATA Sec and PATA Only.

- **Primary ~ Third IDE Master/Slave**

  *** Type**

  Not Installed: no IDE device can be detected by system;

  AUTO: automatic detection of IDE parameters when powering on;

  CD/DVD: used for ATAPI CDROM;

  ARMD: used for various analog IDE devices.

  *** LBA/Large Mode**

  Used to set whether to support LBA mode or not.

  *** Block(Multi-sector Transfer)**

  Used to set whether to support multi-sector simultaneous transfer or not.

  *** PIO Mode**

  Used for PIO mode setting.

  *** DMA Mode**

  Used for DMA mode setting.

  *** S.M.A.R.T**

  Used to set whether to enable S.M.A.R.T function and it is only available for the hard disk supporting this function.

  *** 32Bit Data Transfer**

  This option is used to enable the 32-bit hard disk accessing mode, which could optimize hard disk read and write speed.

- **AHCI Port0 ~ 2**

  AHCI configuration menu, which is displayed only when the SATA controller is configured as AHCI or RAID.

  *** SATA Port0 ~ 2**

  Auto: automatic detection of SATA device when powering on;

  Not Installed: disable the port without inspection.

  *** S.M.A.R.T**

  Used to set whether to enable S.M.A.R.T function and it is only available for the hard disk supporting this function.

➢ **Super I/O Configuration**

BIOS SETUP UTILITY		
Configure Super I/O Chipset		Allows BIOS to Enable or Disable Floppy Controller.
OnBoard Floppy Controller	[Enabled]	
Serial Port1 Address	[3F8]	
Serial Port1 IRQ	[4]	
Serial Port2 Address	[2F8]	
Serial Port2 IRQ	[4]	
Serial Port3 Address	[3E8]	
Serial Port3 IRQ	[3]	
Serial Port4 Address	[2E8]	
Serial Port4 IRQ	[3]	
Serial Port5 Address	[2F0]	
Serial Port5 IRQ	[10]	
Serial Port6 Address	[2E0]	
Serial Port6 IRQ	[10]	
Serial Port7 Address	[200]	←→ Select Screen
Serial Port7 IRQ	[11]	↑↓ Select Item
Serial Port8 Address	[208]	+ - Change Field
Serial Port8 IRQ	[11]	Tab Select Field
Serial Port9 Address	[210]	F1 General Help
Serial Port9 IRQ	[11]	F10 Save and Exit
Serial Port10 Address	[218]	ESC Exit
Serial Port10 IRQ	[11]	
Parallel Port Address	[378]	
Parallel Port Mode	[Normal]	
Parallel Port IRQ	[IRQ7]	
Uart IRQ Attribute	[Edge Active High]	
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- **OnBoard Floppy Controller**

  Used to enable the floppy driver controller.

- **Serial Port n Address**

  Set the addresses of the serial port n on motherboard (n=1…10).

- **Serial Port n IRQ**

  Set the IRQs of the serial port n on motherboard (n=1…10).

- **Parallel Port Address**

  Set the addresses of the parallel port on motherboard; the default value is 378.

- **Parallel Port Mode**

  Set the modes for the parallel port on motherboard.

- **Parallel Port IRQ**

  Set the IRQs of the parallel port on motherboard.

- **Uart IRQ Attribute**

  Set the IRQ attribute for COM 7-10.

➢ **Hardware Health Configuration**

BIOS SETUP UTILITY		
Hardware Health Configuration		Enables Hardware Health Monitoring Device
System Temperature	: 30℃/86℉	
CPU Temperature	: 37℃/98℉	
SYSFAN1		
CPUFAN1		
		←→ Select Screen
		↑↓ Select Item
Vcore	: 1.136 V	+ - Change Field
V3.3	: 3.296 V	Tab Select Field
V5.0	: 5.094 V	F1 General Help
V12.0	: 12.196 V	F10 Save and Exit
VBAT	: 3.152 V	ESC Exit
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- **System Temperature**

  Current system temperature, it is monitored by thermal resistor on motherboard.

- **CPU Temperature**

  Current CPU temperature, it is monitored by temperature sensors on motherboard.

- **Vcore**

  CPU core voltage;

- **V3.3/ V5.0/ V12.0**

  Turn on/off power to output voltage.

- **VBAT**

  Monitor the battery voltage.

➢ **USB Configuration**

BIOS SETUP UTILITY		
USB Configuration		Enables USB host controllers.
USB Devices Enabled:		
1 Keyboard, 1 Drive		
USB Function	[8 USB Ports]	←→ Select Screen
USB 2.0 Controller	[Enabled]	↑↓ Select Item
Legacy USB Support	[Auto]	+ - Change Field
►USB Mass Storage Device Configuration		F1 General Help F10 Save and Exit ESC Exit
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- **USB Function**

  This option sets the amount of USB controller; that is to confirm how many USB controllers are supported. One controller usually supports two USB ports.

- **USB 2.0 Controller**

  This option is used to select whether to support USB 2.0 controller.

- **Legacy USB Support**

  This option is used to support legacy USB devices (such as keyboard, mouse and storage devices, etc); when this option is set to Enabled, the USB device could be used even if under OS that doesn't support USB, such as DOS.

- **USB Mass Storage Device Configuration**

  This option is used to configure the USB mass storage device, including Reset delay setting and enumeration type.

➢ **Power Management Configuration**

BIOS SETUP UTILITY		
Power Management Configuration		
ACPI APIC Support	[Enabled]	←→ Select Screen ↑↓ Select Item + - Change Field F1 General Help F10 Save and Exit ESC Exit
Restore on AC Power Loss	[Last state]	
Resume on RTC Alarm	[Disabled]	
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- **ACPI APIC Support**

  This option is used to enable or disable APIC under ACPI OS.

- **Restore on AC Power Loss**

  This option could set the system status when the computer is re-electrified after powered off under AC. “Power Off” is to make the system at power off status; “Power On” is to power on the system automatically; “Last State” is to recover the status before powering off.

- **Resume on RTC Alarm**

  This option is used to enable or disable the system clock. When the specified time expires, it will wake the system from power saving mode, even from power off mode. This function shall be supported by ATX power.

➢ **Clock Generator Configuration**

BIOS SETUP UTILITY	
Configure Clock Generator	
Spread Spectrum [Enabled]	
Auto PCI Clock [Enabled]	←→ Select Screen ↑↓ Select Item + - Change Field F1 General Help F10 Save and Exit ESC Exit
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- **Spread Spectrum**

  This option is used to control the spread spectrum function of the clock signal.

- **Auto PCI Clock**

  This option is used to detect the devices on PCI slot automatically. If there are no devices in the slot, please disable the clock signal on that slot.

◆ **Chipset**

BIOS SETUP UTILITY		
Advanced Chipset Settings		
WARNING: Setting wrong values in sections below may cause system to malfunction.		
North Bridge Chipset Configuration		
DRAM Frequency	[Auto]	
Configure DRAM Timing by SPD	[Enabled]	←→ Select Screen
Initiate Graphic Adapter	[PCI/IGD]	↑↓ Select Item
Boot Display Device	[CRT+LVDS]	Enter Go to Sub Screen
LVDS Color Depth	[24BIT]	F1 General Help
Flat Panel Type	[800x600/S/18/G104S]	F10 Save and Exit
UserDefine Panel Type	[Disabled]	ESC Exit
South Bridge Chipset Configuration		
PXE Boot	[Disabled]	
Onboard Audio Controller	[Enabled]	
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➢ **DRAM Frequency**

Configure the frequency for DRAM; it is recommended to use automatic modification instead of manual modification; otherwise, it will not be able to power on because it is not supported by DRAM.

➢ **Configure DRAM Timing by SPD**

BIOS configures the time sequence of the SDRAM according to the contents of the SPD chip. Most of the memory bank has one small chip to save the time sequence and capacity of the memory, i.e. the SPD chip.

➢ **Initiate Graphic Adapter**

This option is used to specify the boot-up priority of the video device type.

➢ **Boot Display Device**

This option is used to select the default display device when booting.

- **LVDS Color Depth**

  This option is used to select the color depth of LVDS.

- **Flat Panel Type**

  This option is used to select the resolution for Flat Panel.

- **UserDefine Panel Type**

  Configure the flat panel display type according to user definition.

- **PXE Boot**

  This option is used to select whether to enable LAN PXE boot function.

- **Onboard Audio Controller**

  Select whether to enable the audio card controller.

◆ **PCIPnP**

BIOS SETUP UTILITY		
Advanced PCI/PnP Settings		
WARNING: Setting wrong values in below sections may cause system to malfunction.		
IRQ3	[Available]	←→ Select Screen
IRQ4	[Available]	↑↓ Select Item
IRQ5	[Available]	+ - Change Field
IRQ7	[Available]	F1 General Help
IRQ9	[Available]	F10 Save and Exit
IRQ10	[Available]	ESC Exit
IRQ11	[Available]	
IRQ14	[Available]	
IRQ15	[Available]	
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- **IRQ3 ~ 15**

  This option is used to specify whether the IRQ number is PNP mode or reserved for ISA.

◆ **Boot**

BIOS SETUP UTILITY		
Boot Settings		←→ Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit
Quick Boot	[Enabled]	
Quiet Boot	[Disabled]	
Waite For 'F1' If Error	[Enabled]	
Boot Device Priority		
Boot from Embedded WinCE	[No]	
1st Boot Device	[USB: aigo USB DISK]	
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➢ **Quick Boot**

During BIOS booting period, configure whether to permit skipping certain test to reduce BIOS booting time.

➢ **Quiet Boot**

Configure whether to display the content of OEM LOGO.

➢ **Wait For 'F1' If Error**

Configure whether to prompt pressing "F1" during system error.

➢ **Boot from Embedded WinCE**

Configure to boot from WinCE system.

➢ **1st ~ 4th Boot Device**

Configure the priority of the boot sequence for devices when the system boots.

◆ **Security**

BIOS SETUP UTILITY	
Security Settings	Install or Change the password
Supervisor Password :Not Installed	
User Password :Not Installed	←→ Select Screen ↑↓ Select Item Enter Change F1 General Help F10 Save and Exit ESC Exit
Change Supervisor Password	
Change User Password	
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➢ **Change User/ Supervisor Password**

After pressing Change User/ Supervisor Password and input new password in the dialog box, this column will indicate that user's password has been installed.

◆ **Exit**

South Bridge Configuration	
Exit Options	Exit system setup after saving the changes.
Save Changes and Exit	
Discard Changes and Exit	←→ Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit
Discard Changes	
Load Optimal Defaults	
Load Failsafe Defaults	
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- **Save Changes and Exit**

  When you have finished all the changes and want to cover the original parameters, you may implement this operation and save the new parameters into CMOS storage. To implement this operation, you may choose this option and press < Enter >; press < Enter > again to exit.

- **Discard Changes and Exit**

  If you do not want to save the change into CMOS storage, please choose this option and press < Enter >; press < Enter > again to exit.

- **Discard Changes**

  If error occurs in your change and the changes need to be neglected, please choose this option and press < Enter > in order to enter corresponding options again and reset it.

- **Load Optimal Defaults**

  This menu is used to input default value in system configuration. These default values are optimized and could give play to the high capability of all hardware.

- **Load Failsafe Defaults**

  The function of this option is to initialize the setup of each option to realize the most fundamental and secure system functional value. To implement this function, choose this option and press < Enter >; messages to be confirmed will be shown on the screen, press < Enter > to implement this function.

System Resource Managed by BIOS under X86 Platform

We define three kinds of system resources here: I/O port address, IRQ interrupt number and DMA number.

◆ **DMA**

Level	Function
DMA0	DRAM Refresh
DMA1	Unassigned
DMA2	Unassigned
DMA3	Unassigned (sometimes used for hard disk)
DMA4	Used for DMAC Cascade
DMA5	Unassigned
DMA6	Unassigned
DMA7	Unassigned

◆ **APIC**

Advanced programmable interrupt controller. Most motherboards above P4 level support APIC and provide more than 16 interrupt sources, like IRQ16 - IRQ23; while some others can have up to 28 interrupt sources, such as motherboard supporting PCI-X. However, relevant OS are required to enable that function, and currently, only the OS above Windows 2000 could support that function.

◆ **IO Port Address**

There is 64K for the system I/O address space. Each peripheral will occupy portion of the space. The table below shows parts of the distribution of the I/O address. As the address of PCI device (e.g. PCI network card) is configured by software, it is not listed in this table.

Address	Device Description
000h - 00Fh	DMA Controller #1
020h - 021h	Programmable Interrupt Controller #1
040h - 043h	System Timer
060h - 064h	Standard 101/102 Keyboard Controller
070h - 071h	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0A1h	Programmable Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h – 0FFh	Numeric Data Processor
1F0h - 1F7h	Primary IDE Channel
200h – 207h	COM7
208h – 20Fh	COM8
210h – 217h	COM9
218h – 21Fh	COM10
274h – 279h, A79h	PnP Configuration Register
2E0h – 2E7h	COM6
2E8h – 2EFh	COM4
2F0h – 2F7h	COM5
2F8h - 2FFh	COM2
378h - 37Fh	LPT1
3B0h – 2BBh	Intel(R) Graphics Media Accelerator 3150
3C0h – 2DFh	Intel(R) Graphics Media Accelerator 3150
3E8h – 3EFh	COM3
3F6h - 3F6h	Primary IDE Channel
3F8h - 3FFh	COM1
400h– 41Fh	SMBus Controller

◆ **IRQ Assignment Table**

There are 15 interrupt sources of the system. Some are occupied by the system devices. Only the ones that are not occupied can be distributed. The ISA devices claim to engross the interrupt. Only the plug and play ISA devices can be distributed by the BIOS or the OS. And several PCI devices share one interrupt through the distribution of BIOS or OS. The diagram below shows parts of the interrupt distribution under X86 platform, but it does not show the interrupt source occupied by the PCI devices.

Level	Function
IRQ0	System Timer
IRQ1	Standard 101/102 Key or Microsoft Keyboard
IRQ2	Programmable Interrupt Controller
IRQ3	COM#3-#4
IRQ4	COM#1-#2
IRQ5	Reserved
IRQ6	Reserved for FDD controller
IRQ7	Parallel Port
IRQ8	System CMOS/Real Time Clock
IRQ9	ACPI
IRQ10	COM#5-#6
IRQ11	COM#7-#10
IRQ12	PS/2 Mouse
IRQ13	Numeric Data Processor
IRQ14	Primary IDE
IRQ15	Reserved

Chapter 4 Install the Drivers

Regarding the driver program of this product, please refer to the accompanying CD.

Appendix

Watchdog Programming Guide

The board provides a programmable watchdog timer (WDT) up to 255 levels and timed by minute or second. Watchdog timeout event can be programmed to reset system or generate maskable interrupts.

The available IRQ numbers for this board are: 3, 4, 5, 7, 9, 10 and 11.

Please modify the corresponding IRQ number in PCIPnP of BIOS Setup interface into "Reserved" before using.

The following describes WDT program in C language. The steps to program WDT are listed as follows:

- Enter WDT programming mode;
- Set WDT operating mode, enable WDT/disable WDT.

(1) **Enter** WDT **Programming Mode**

```
#define   INDEX_PORT   0x2E
#define   DATA_PORT          0x2F

outportb(INDEX_PORT,0x87);
outportb(INDEX_PORT,0x01);
outportb(INDEX_PORT,0x55);
outportb(INDEX_PORT,0x55);
outportb(INDEX_PORT,0x07);
outportb(DATA_PORT,0x07);
```

(2) **Set** WDT **operating mode, reset mode or interrupt mode:**

a. **Configure** WDT **to reset mode**

```
outportb(INDEX_PORT,0x72)
outportb(DATA_PORT,00);
outportb(INDEX_PORT,0x72);
 int val=inportb(DATA_PORT);
```

```
    val |=0x40;
    outportb(DATA_PORT, val);
```

b. **Configure** WDT **to interrupt mode**

```
    outportb(INDEX_PORT,0x72)
    outportb(DATA_PORT,IRQ_ NO); /*Please replace the constant IRQ_NO with
    the interrupt number need to be used. The available range of the interrupt
    number has been listed in the beginning of this chapter*/
    outportb(INDEX_PORT,0X72);
    int val=inportb(DATA_PORT);
    val&=0xBF;
    outportb(DATA_PORT, val);
```

(3) **Configure** WDT **to time by minute or second:**

a. **Time by minute:**

```
    val &=0x7f;
    outportb(INDEX_PORT, 0x72);
    outportb(DATA_PORT,      val);
```

b. **Time by second:**

```
    val |=0x80;
    outportb(INDEX_PORT，0x72);
    outportb(DATA_PORT,      val);
```

(4) **Enable/disable** WDT

a. **Enable WDT:**

```
    outportb(INDEX_PORT,0x73);
    outportb(DATA_PORT,TIME_OUT_VALUE); /*Please replace the constant
    TIME_OUT_VALUE with the unit number of timeout value (0x01 ~ 0xFF)*/
```

b. **Disable WDT:**

```
    outportb(INDEX_PORT,0xf6);
    outportb(DATA_PORT,0x00);
```

Digital IO Programming Guide

The board provides 16-channel programmable digital IO pins, eight for input while the other eight for output.

The following provides digital I/O program in C language; please follow the steps below to implement digital I/O programming:

- Initialize digital I/O
- Input/output program

(1) **Initialize digital I/O:**

```
#define     BAR 0x400

unsigned char tmp_val;
outportb(BAR,0xbf);
outportb(BAR+0x04,0x40);
outportb(BAR+0x03,0x03);
outportb(BAR+0x05,0x0f);
tmp_val =(inportb(BAR+0x02)|0x08)&0xeb;
tmp_val |= 0x40;
outportb(BAR+0x02, tmp_val);
delay(30);
tmp_val =inportb(BAR);
while((tmp_val &0x02)!=0x02)
    {
        tmp_val =inportb(BAR);
        if((tmp_val &0x04)!=0)
        {
            printf("ERROR\n");
            return 0;
        }
    }
outportb(BAR,0xbf);
outportb(BAR+0x04,0x42);
outportb(BAR+0x03,0x03);
```

```
outportb(BAR+0x05,0x0f);
tmp_val =(inportb(BAR+0x02)|0x08)&0xeb;
tmp_val |= 0x40;
outportb(BAR+0x02, tmp_val);
delay(30);
tmp_val =inportb(BAR);
while((tmp_val &0x02)!=0x02)
    {
        tmp_val =inportb(BAR);
        if((tmp_val &0x04)!=0)
        {
            printf("ERROR\n");
            return 0;
        }
    }
```

(2) **Input/output program:**

a. Output Program

Functions input: int pin - Value 1 ~ 8 are corresponding with output pin 1 ~ 8
int lev_val - 1 is to output high level; 0 is to output low level

Functions Output: none

```
void Out_Lev(int pin ,int lev_val)
  {
    unsigned int reg_val ;
    outportb(BAR,0xbf);
    if(pin < 5)
    {
        outportb(BAR+0x04,0x40);
    }
    else
    {
```

```
                outportb(BAR+0x04,0x42);
                pin = pin – 4;
        }
        outportb(BAR+0x03,0x01);
        reg_val = inportb(BAR+0x05);
        reg_val = lev_val ?
reg_val|(0x01<<pin-1) :reg_val&(~(0x01<<pin-1)) ;
        outportb(BAR+0x05, reg_val);
        reg_val =(inportb(BAR+0x02)|0x08)&0xeb;
        reg_val |= 0x40;
        outportb(BAR+0x02, reg_val);
        delay(30);
        reg_val =inportb(BAR);
        while((reg_val &0x02)!=0x02)
                {
                        reg_val =inportb(BAR);
                        if((reg_val &0x04)!=0)
                        {
                                printf("ERROR\n");
                                return 0;
                        }
                }
}
```

b. Input Program

Functions Input: int pin - Value 1 ~ 8 are corresponding with the input pin 1 ~ 8

Functions Output: int lev_val - 1: the input pin is high level; 0: the input pin is low level

```
int In_Lev(int pin)
{
        unsigned int reg_val ;
        int lev_val ;
```

```
    outportb(BAR,0xbf);
    if(pin < 5)
    {
        outportb(BAR+0x04,0x41);
        pin = pin +4;
    }
    else
    {
        outportb(BAR+0x04,0x43);
    }
    outportb(BAR+0x03,0x00);
    reg_val =(inportb(BAR+0x02)|0x08)&0xeb;
    reg_val |= 0x40;
    outportb(BAR+0x02, reg_val);
    delay(30);
    reg_val =inportb(BAR);
    while((reg_val &0x02)!=0x02)
        {
            reg_val =inportb(BAR);
            if((reg_val &0x04)!=0)
            {
                printf("ERROR\n");
                return 0;
            }
        }
    lev_val = inportb(BAR+0x05)&( 0x01<<pin-1);
    lev_val = lev_val ? 1:0; /*Get the variable lev_val, 1 represents that
    the input pin is high level, while 0 represents the input pin is low
    level*/
    return lev_val ;
}
```

Troubleshooting and Solutions

NO.	Phenomenon	Troubleshooting and Solution
1	BIOS setting cannot be saved	Analysis: it could be the problem of the CMOS battery.
		Solution: measure the CMOS battery with a multi-meter; if the voltage is insufficient, replace the battery; re-set the BIOS and save again.
2	The computer can only be powered-on occasionally	Analysis: it may be caused by poor connection. Remove the power plug from power socket on motherboard, you may detect that certain pin of the motherboard power has been collapsed to one side after several times insertion.
		Solution: power off the computer and remove the power plug; erect the bended power pin with tweezers and re-insert in the power socket. Reboot the computer and test for several times until the problem no longer exits.
3	When connecting with a USB flash drive, the system prompts that a high-speed device has been connected with a low-speed connector.	Analysis: A USB flash drive is a high-speed USB2.0; when connecting with the computer, it prompts that a high-speed device has been connected with a low-speed connector, which indicates that the connector on motherboard is regarded as a USB1.1 port.
		Solution: enable the USB high-speed transmission mode on the motherboard. Different motherboards may have different settings. Change the FULLSPEED option to HISPEED in USB device option.
4	The screen has no display after replacing with a new memory and cannot enter system; even when the former memory is re-installed, the system cannot be booted as well.	Analysis: it could be resulted from improper operation when inserting or removing the memory and causes abnormal operation of the components on the motherboard. Focus on the circuit related to the memory on the motherboard.
		Solution: check the hardware such as memory, video card first; if it shows that the hardware are all OK, then check the circuit around the memory slot on motherboard carefully; you may detect that the two pins connected with the gold finger in the first memory slot are shorted while the second memory slot is normal, then you may know that there is short circuit in the first memory slot. Remove the two pins to their original location with tweezers carefully, insert the memory, reboot the system and the system will be booted smoothly.

5	The system cannot be booted after replacing a CD-ROM.	Analysis: the data cable of the hard disk may get knocked when installing the CD-ROM, which leads to poor connection of the hard disk data cable, or the master and slave jumpers on hard disk and CD-ROM are wrongly set.
		Solution: check the data cable of the hard disk and the IDE connectors on hard disk and motherboard first; if there are no problems, then check the master and slave jumper setting. You may detect that the hard disk and CD-ROM are connected with different data cables while their jumpers are all set to master; thus, the hard disk cannot be booted. Set the CD-ROM jumper to slave and then re-install it.
6	No PCI card can be detected after entering the system.	Analysis: make sure the PCI card functions normally; re-insert the PCI card or insert it into another PCI slot to see whether it is normal; find out the power type in use (AT or ATX); find out users' requirement for the PCI card voltage.
		Solution: if the PCI card functions abnormally, replace it with a new one; if it functions normally when re-inserted or inserted in another PCI slot, then there is something wrong between the PCI card and the slot. If AT power is adopted and the PCI card requires 3.3V voltage, then the AT power shall be replaced with ATX power because AT power cannot provide 3.3V voltage. (Suggestion: when purchasing power supplies, please check whether the PCI card in use requires 3.3V voltage or not).
7	No peripheral devices can be detected.	Analysis: devices are not connected; no drivers are loaded; devices are broken.
		Solution: check whether the cable between the device and the motherboard is normal; if it is normal, replace it with a new cable to make sure the connection is OK. Re-install the device driver and check whether it can be recognized; check whether the device is normal; if the device is normal, then check whether the device is compatible with the motherboard.